

Will video be the next generation of e-commerce product reviews? Presentation format and the role of product type



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ABSTRACT

Researchers have systematically investigated the influence of online reviews on consumer perceptions and decisions to purchase products, but hitherto have not attended to the presentation format. Increasingly, video reviews are making their way into various websites, and their impact on consumer perceptions is not yet known. While prior research has investigated the impact of video presentation of vendor supplied product information, the effects of video presentation formats of online reviews posted by consumers, in relation to other commonly used formats such as text, are not known. The conditions of effectiveness of these presentation formats should also to be investigated so that guidelines for appropriate use can be developed. Hence, in this study, using theoretical foundations anchored on elaboration likelihood model and cognitive fit theory, we conducted a laboratory experiment comparing the impact of online reviews displayed in three presentation formats—text, image, and video—on three products—a digital camera, backpack, and videogame.

We find that the presentation format of online reviews has a substantive and nuanced impact on consumer perceptions. Product type significantly moderates the effect of presentation format on consumer perceptions. Highlighting the role of presentation format and product type, our findings indicate that more research on presentation format is warranted, and vendors should make efforts to manage the presentation of online reviews. We discuss these findings, and theoretical and practical implications of the study.

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1. Introduction

Video reviews are making their presence on vendor websites such as Amazon.com and BestBuy.com, independent sites such as CNET and DpReview, and social media such as Twitter and Facebook. Merchants across the globe are starting to encourage customers to upload online reviews in video formats. Recently, Proctor and Gamble, invited users to post video product reviews for a new product, Tide Pods, launched in 2012. Much to their surprise, this received hundreds of responses from consumers even though creating a video review requires more effort and technical support than posting a text review [94]. These events motivate researchers to ask important questions as to whether video reviews will become the next generation of e-commerce product reviews, and if so, what are the products and conditions when they will be most effective? Answers to these questions will help researchers focus on the value of an Information Technology (IT) artifact in e-commerce and also

help develop guidelines for practitioners on how to best design their websites.

As an electronic equivalent of Word-of-mouth (WOM), product reviews have long been recognized as influencing product sales and are seen as a valuable asset to business organizations [15,24,29,31,39,50,117,122]. Customer recommendations posted beside vendor-generated product descriptions powerfully affect consumers' information acquisition and thus their perceptions about the product [59,82]. In fact, a study by PowerReviews found that 59% of customers believe that product reviews have a strong impact on their buying behavior [91]. Researchers and industry professionals reiterate that vendors must pay greater attention to managing online reviews to garner more positive consumer impact [3,12,21,39,59]. Hence, researchers have taken up investigation on various features and components of online reviews to evaluate their influence on consumer perceptions. They find that the severity of language used in the review, star ratings, and reviewers' identities and backgrounds, among other factors, play significant roles [13,28,31,82,119]. However, even though there is an increasing use and encouragement to customers to post online reviews in video format, research on the effects of this presentation format of online reviews is sparse.

Compared with commonly used text-based formats, online reviews with video formats present relatively more realistic visual

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cues and dynamic movements for conveying product experiences that could be expected to have a powerful impact on consumer perceptions. Supporting this expectation is a wealth of research in Information Systems (IS) indicating that information presentation formats have a significant impact on user perceptions, and must be managed [43,68,111,113,118]. But without adequate examinations, the role of the IT artifact of video reviews will be unclear, and we cannot be sure that the technology artifact is exploited enough to improve presentation richness [10,55,56]. An investigation into video reviews could also address the call by researchers that more research on the role of visual aspects of presentation on consumer perceptions be evaluated [64,74].

The extent of influence of video reviews on consumer perceptions cannot be assumed because some studies indicate that enhanced visual formats may deteriorate information-seeking behaviors and user attention [44,69]. Furthermore, consumer search and learning behaviors in technology-mediated environments depend on product type, and any study of online reviews must account for differences in product type [51,82,114]. A product type classification most often used in research useful to understanding the impact of presentation format is the classification into search and experience goods [51,59,84]. Search goods have the most search attributes and are easily described by product features such as size, weight, and warranty. Experience products have more experience attributes, and their product features are best felt and seen, such as the feel and movement of vehicles and smell of perfumes [35, 84]. IT in e-commerce marketing environments is changing consumers' information-seeking behaviors for search and experience goods, and it is important to determine the impact of IT based presentation formats in online reviews on consumer perceptions, conditions of fit with product types [45,51,112].

Although there are several extant studies on the effect of presentation format in e-commerce contexts, the focus of this study differs in several ways. First, prior studies focus on the format of vendor-created product information and formats, while our focus is on customer generated reviews that importantly include customer perceptions and the blending of their subjective post-purchase opinions [2,8,55]. Second, instead of directly examining the effect of video format, we include text format as a benchmark, because text is the prevalent standard for online reviews [55]. This highlights the comparative merits of a video format under differing conditions. Third, unlike prior studies that focus solely on the presentation format and how it should be applied to website design, we focus our investigation to determine the fit between the task and presentation format [2,55]. Due to the extra cost in posting a video review, aesthetic fatigue and visual overload, vendors should encourage consumers to work on the products that are most suitable to be reviewed in a video format, underscoring the value of a fit between product (task) and format [81]. Given these differing foci we undertook a study to specifically investigate the relative effects of video presentation formats in online reviews.

Using the elaboration likelihood model and cognitive fit theory, we hypothesized presentation format effects on consumer perceptions about the review's credibility, helpfulness, and persuasiveness, and on intentions to purchase the product. To test those hypotheses, we conducted a laboratory experiment, evaluating the effects of online reviews in text, image, and video presentation formats for three products, a backpack, a camera, and a videogame. The camera is generally classified as a search product and the videogame as an experience product [82,83]. Backpack, which was added for exploratory purpose, resides between a continuum from pure search goods and pure experience goods [35]. We found support for our hypotheses that presentation format affects consumer perceptions, and such effects are moderated by product type. In the next section, we present our research framework. In Sections 3 and 4 we describe the experimental method and findings respectively, followed by a discussion of the implications of the study.

2. Research framework

2.1. Online reviews

IT has enhanced the role and reach of WOM by enabling consumers to share product opinions with global audiences [12,39,51,59,82]. It also allows firms to play active roles in electronically transmitting those opinions by being observers, moderators, mediators, or participants [36,37]. By better understanding the impact of various online review features, moderator roles allow firms to take concrete steps to enhance the effects of disseminating information, such as organize online communities for consumer discussions, facilitate the posting of online reviews, create recommendation programs, and offer incentives [36,37, 119]. For example, consumers exhibit preferences for the extent of objective and subjective information presented in online reviews for different product types. Hence, vendors could list online reviews that will be preferred and perceived as being more useful, and supply review templates to improve review credibility [3,13]. Similarly, if firms can understand the impact of different presentation formats they could proactively use those formats that will have the desired impact.

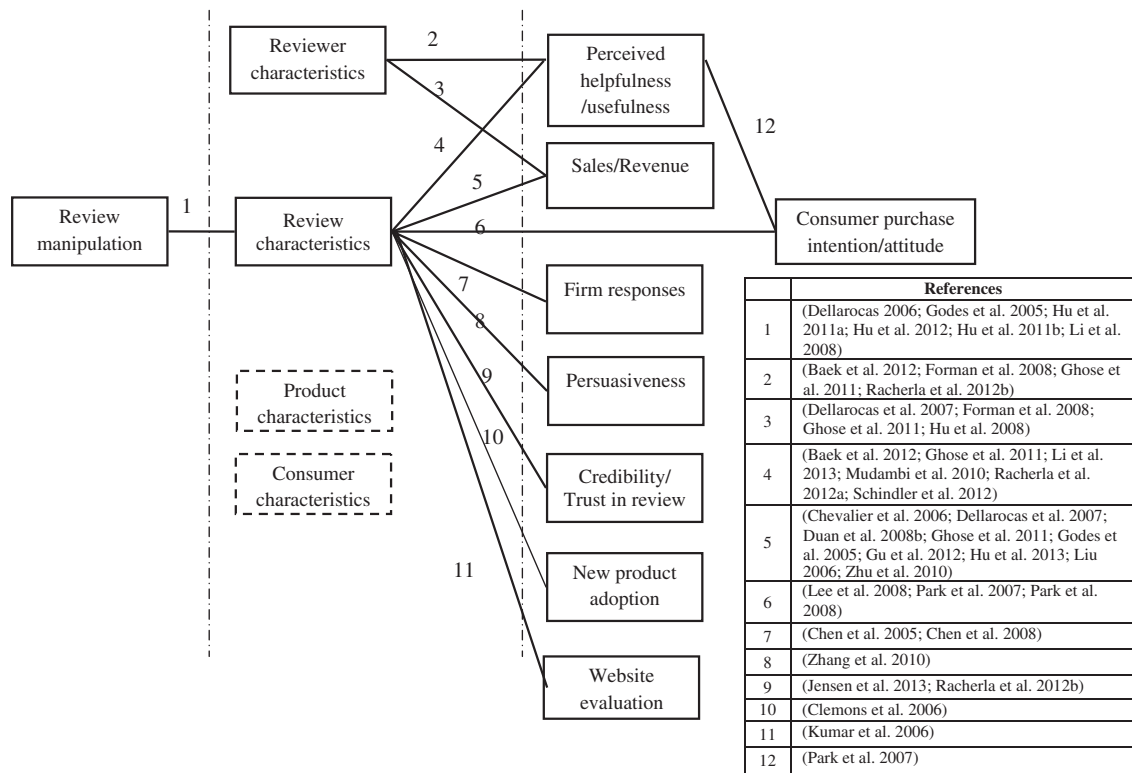
Currently, however, there are not many research studies that have examined the effects of presentation format even though this is a very IT related issue. Our brief synthesis of research on online reviews presented in Fig. 1 indicates that researchers are investigating content-related features of online reviews in different market segments, but not the technology format for review presentation [11,22,34,46–49,53,65,66,70,92,93]. When posted along with product information, online reviews play a unique and particularly powerful role in influencing consumer decisions; they are essentially free “sales assistants” [12]. Therefore if firms can identify which presentation formats will influence consumer perceptions, they can leverage IT artifacts in their e-commerce infrastructure.

2.2. Presentation formats and product types

Most customer-written online reviews currently are in text format. But slowly video-based reviews are finding their way and some websites have started to let consumers post video-based reviews (e.g. Amazon, BestBuy, etc.). Consequently, excepting a few, most of the existing research studies in IS on the topic of online reviews are conducted using text-based reviews and show that consumer perceptions are affected by the severity of language, the valence of opinions, and abstractness of comments (e.g. [3,82,119]). In the future there may be increased use of video based reviews and it is important to determine if the presentation format changes from text to video could affect consumer perceptions. Some studies show that peripheral cues in text based reviews such as reviewer rating, identity, and credibility are influential (e.g. [4,31]). But some popular vendor websites, such as Amazon, have online product reviews so vast that they create information overload, and adding peripheral cues with video presentation format may not always have a positive impact [88, 119]. This has to be systematically investigated to determine if indeed adding video based presentations would be beneficial to vendors.

IS research findings show that presentation with peripheral visual cues attracts attention and can be more persuasive in e-commerce [1, 10,44,56,67,114]. Visual presentation formats confirm verbal descriptions and reduce uncertainty about product performance [67,114]. Dynamic and moving videos capture attention, by vividly presenting stimuli for different processing channels to enhance cognition [44,56, 78,114,121]. In electronic WOM, and more generally in e-commerce contexts, capturing attention is a big challenge, and visual cues could help [30,74,79].

However, although visual cues and moving images attract attention, they may also distract and split attention, depending on the context. Thus rich presentation formats could be counterproductive [44,69,77, 78,109,121]. Some researchers argue that distraction and unplanned consequences may happen only occasionally, when users focus on the visual saliency rather than the content, or where the visual cues are



Note: Product characteristics and consumer characteristics are usually considered as moderators.
We did not include studies on motivations of writing product reviews.

Fig. 1. Brief summary of online product review literature.

improperly aligned with the task [71,77,97,98]. Widely applied in IS, as per cognitive fit theory [112], the effects of presentation format will depend on the specific situation, that is it should fit the information requirements for that particular context. Visual cues are most effective when the information content involves several dimensions, dynamic processes, or spatial relationships [25,77,108,109,111]. These findings suggest that more visual information, such as video presentations rather than text, could have a positive influence in online reviews, but depends on the context, and has to be systematically tested and evaluated, particularly because consumers have different information requirements for differing product types [56,67,102,111,112,115].

Products broadly fit into two major categories regarding how easily consumers can obtain information for assessing product quality prior to purchase [83,84]. Some products, such as videogames, are classified as experience goods, with characteristics on which information is not readily available from open sources [83]. Hence, consumers may have to purchase the product or somehow get to know how it feels and behaves by relying on statements from other consumers [51,59,82]. For products termed search goods, such as laser printers, adequate information is more easily available to consumers prior to purchase and they can evaluate its quality [83].

This search versus experience classification of product types was developed some time ago, but is still relevant and widely used. Although researchers have used other classifications such as hit–niche and low involvement–high involvement, we adopt the search and experience categorization. It is the most popular classification based on product characteristics [35,39,59] relevant to our study of online review presentations, and because information requirements and search behaviors tend to differ for these product types [51,59,82,114]. In fact, WOM effects are more or less relevant depending on search versus experience attributes, and could explain why consumers prefer certain formats at

different times [84]. For these reasons, researchers suggest that based on consumer search behaviors, the effects of presentation medium on consumer perceptions will not be the same across all product types and must be examined [59].

2.3. Development of hypotheses

Online reviews allowing customers to report their product experiences should be designed for effective communication [12]. Online review features are often studied as to whether they seem credible, helpful, and persuasive [4,13,82,96]. To determine whether online review presentation formats could impact consumer perceptions on those dimensions, we use the elaboration likelihood model (ELM) Petty and Cacioppo [90], which indicates that online reviews provide argument logic and merits through central or peripheral routes. In central routes, persuasion occurs through message elaboration: if recipients understand the message and are motivated to act on it, attitude changes are likely. In peripheral routes, rather than message elaboration, recipients respond to environmental characteristics such as the source's perceived credibility, the message presentation formats, the attractiveness of the source, or an accompanying catchy slogan [90].

Online reviews, as objective statements from actual consumers, have some baseline credibility. Unlike vendors' statements, they are perceived as unbiased and credible [12]. As Fig. 2 shows, common text-based online reviews have only one way of presentation with no visual cues. As Fig. 2b shows, pictures may embellish text-based reviews on some websites, but video-based reviews are richer in color, visual cues, dynamic movements, and sound—multiple modes that seize attention. Visual cues are distinctive, contextualized, and facilitate information processing without added overload [4,13,44,68,69,74,76,79,82,95,96]. Compared with text-based reviews, video-based reviews could

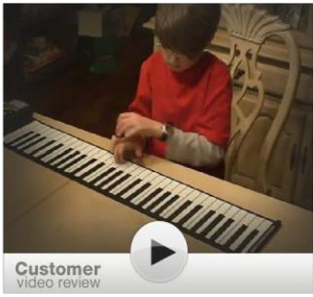
Here is one product that seems to have been left unmodified for 60 GRAHAMs. The product consists of a total 345 grams of graham cr the typical adult in America weighs about 65 kilograms. The crackers come in a box, and in the box are six envelopes, each consumer, and perhaps people in Europe, might be more used to gr only 1/2 crackers that are square, instead of full-crackers that are crackers once in a while. Yet another reason for this new packaging rectangular crackers, during transportation. But a more likely reason is to allow people to take individual serving that the crackers will be kept safe, secure, and intact. In my opin Thus, the great benefit of the HONEY MAIN FRESH STACKS produc school or trips. Now for the good part. The crackers taste just the same as they I got the whiff of vanilla. Or anyway, it was a pleasant aroma. The the color of a stone formation at one of the National Parks in Utah side. Compared to another type of cracker, for example, SALTINES conclude, I would not characterize this food as "an adventure," bu	 To understand my review, you need to under something. I take into account if I'm going to will not settle on anything until I find the one perfect version of what they're looking for, si I had that feeling when I found this watch. E time without having to search through the lit clasp one-handed because it slips right onto feminine & not bulky in any way like so many get in the way. It's that accessory that you ladies, you know what I mean. Personally, I was willing to pay whatever pric The photo isn't at all complimentary, so don't romantic novel :).	
a) Text-based review	b) Image-based review	c) Video-based review

Fig. 2. Samples of online reviews in different presentation formats.

enhance message effectiveness through peripheral routes where color, motion, and sound make the message more attractive, vivid, and salient Nisbett and Ross [85]. Moreover, media richness theory [20,27], applied in the IS context, shows that multiple cues make a message more clear, salient, and attention-grabbing. Messages in both verbal and nonverbal formats, such as words and pictures pertaining to the same object, generate more attention and understanding [76,95]. Thus, per media theories, multiple cues and richer representations of information allow recipients to better understand the message and perceive it as more credible and persuasive [57]. Thus, we hypothesize,

H1. Video-based online reviews are perceived to be more credible (H1a), helpful (H1b), and persuasive (H1c), compared to text-based online reviews.

Because information requirements of consumers are not similar for disparate product types, the superior effects of video presentation format of online reviews will be more pronounced on experience goods compared to search goods. Consumers find it more difficult to evaluate the quality of experience goods because the attributes have to be felt. Hence, when consumers visit a web-site, they engage in greater depth of search with experience goods relative to search products [51]. Consumers face a greater level of uncertainty in assessing the quality of experience goods that can create uneasiness [72]. More cognitive effort is required to evaluate experience attributes, and there is greater subjectivity, as well as greater perceived risk [42,51]. Text-based reviews require prospective consumers to interpret and imagine customer reactions and thus expend greater cognitive effort, while video-based presentation formats will mitigate some uncertainties and reduce cognitive efforts needed for experience goods by displaying other consumers' experiences clearly and unambiguously. Concrete and vivid information provide temporal and sensory information to consumers to vicariously feel the experience attributes [85].

Cognitive fit theory suggests that video-presentation formats are a greater cognitive fit for acquiring information about experience goods by better representing spatial relationships and movements integral to the product [111,112], consequently granting better mental representations of product features. As per ELM, video-based presentations add peripheral qualities. For experience goods, video-based presentations provide the feel, clarify consumer reactions and experiences, reduce uncertainty associated with experience attributes, and improve the logic and persuasiveness. Source credibility, one of the most important characteristics affecting online review perceptions, is more relevant for evaluating experience attributes than for search attributes [13,114]. Although text-based reviews credibly convey search goods' attributes such as size, price, color, and shape, they are less credible in showing consumer-product interactions and subjective experiences needed to evaluate an experience good. Thus, we can expect consumers

to perceive video-based presentation format as having greater credibility, helpfulness, and persuasiveness for experience goods than for search goods.

Based on the above, we hypothesize:

H2. Video-based reviews generate more positive impact on consumer perceptions in terms of credibility (H2a), helpfulness (H2b), and persuasiveness (H2c), for experience goods compared to search goods.

Presentation format in the e-commerce context have multifaceted effects on consumers that could include both the perceptions resulting from visiting the website and the transactional aspects of the visit [40, 56,60]. Better presentation formats could build better consumer relationships by eliciting positive perceptions about online reviews. More positive transactional aspects could increase consumer intentions to purchase a product [56,60,82]. Vendors and marketers are interested in investigating online reviews and tracking them assiduously for their influence on consumer purchase decisions [31,82]. Richer online presentation formats could enhance perceptions that online reviews are credible, helpful, and persuasive, which could positively impact consumers' intentions to purchase the product. To test those ideas, we established the following hypothesis:

H3. More positive perceptions of online reviews will lead to greater intentions to purchase the product.

Fig. 3 depicts our proposed research model, with consumer perceptions of online reviews as a second-order factor formed by first-order dimensions of credibility, helpfulness and persuasiveness.

3. Research method

A laboratory experiment was conducted to systematically study the effects of online review presentation formats [58]. In keeping with prior research, we include a spectrum of both search and experience products [51]. We selected three products as shown in Appendix C. A camera was chosen to represent a search product as it represents a fairly standardized product, whose features are easily described. Hence, information on product quality of cameras is relatively easy to obtain prior to interaction with the product [82,83]. We then chose a virtual pet videogame developed for Sony Play Station 3, which would be classified an experience product [35,82]. It has many experience attributes that makes it relatively difficult to obtain information about product quality prior to personal interaction with the product. Finally, a back pack was chosen because it falls on the boundary of a search and experience product with about half of respondents (54%) classifying it as search [35]. Although the functionality and product features are standardized, and easily described, it tends to come in different sizes, colors and textures,

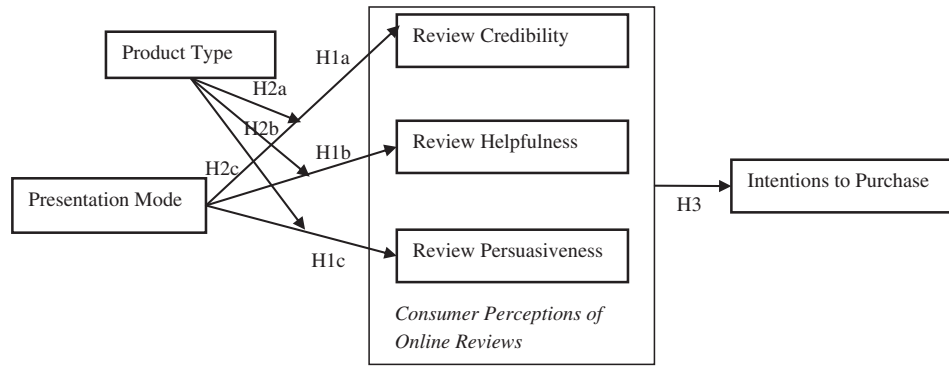


Fig. 3. Research model.

which are hard to evaluate prior to purchase. While our hypotheses and research framework called for testing the video-based presentation vis-à-vis a text-based format, some websites also use text-based reviews that include one or two product images. To simulate a realistic e-commerce scenario for study participants, we included this intermediate condition, which we call an image-based presentation format which included two product images along with the text. Those images came from the snapshots of the products' video-based reviews. Thus we had three presentation formats: text, image, and video—and three products: backpack, camera, and videogame. We controlled information content, so that product information in terms of size and dimensions were uniform across various presentation formats, and the differences were primarily in terms of visual saliency.

We applied a repeated measure within-subject design to minimize the effects of individual preferences and differences among study participants [18,104]. With a random assignment of product type and presentation format, it would be possible to have $3 \times 3 \times 2 \times 2 = 36$ unique combinations of product type and presentation format. A complete design would be impractical because of its complexity and difficulty to obtain adequate sample sizes in each condition. Viewing the same product in three different presentation formats would create a maturation effect as well. To avoid these learning effects and yet have a practical design that economized on the number of study participants, we used a counterbalancing experimental design and accounted for treatment order so that three different products were employed for each of the presentation format [99,104]. Because we were testing product type for its moderating effect, we ordered the product appearance to be camera, backpack, and videogame, and randomly assigned our key treatment, i.e., the presentation format. This resulted in 6 (3×2) unique combinations of presentation format and product type as shown in Appendix A. Participants obtained online reviews on all three products and in all three presentation formats. We set up an experimental website where participants could log with their unique identifier and complete the experimental procedures.

3.1. Selection of products and online reviews

The three products, a Flip ultra-video digital camera, a 30-liter cross-over Thule backpack, and the virtual pet videogame developed for Sony Play Station 3, were marketed on Amazon. For devising realistic online reviews, we obtained actual video reviews posted at Amazon.com. As we intended to compare the effects of video reviews to the commonly used text reviews, these reviews were transcribed and edited, and used to create the reviews in the text format [55,82]. The text review was purely textual. The image online review included text and two images obtained via a screen capture from the actual video review. The video review contained a video presentation with moving images. To avoid confounds, if there was very extreme language, we modified, and based on pilot tests, set each review to average about 400 words or 2.5 minutes [19,82]. We used the same method to develop the online

reviews for all products, and since we were comparing the relative effects of video versus text presentation formats on the three products, this helped to maintain the information equivalence between the treatments for the three products. We took extra effort to ensure information equivalence across the treatments, by checking our scripts and having it scrutinized by people not connected with the experiment. We also tested this through pilot studies where we debriefed and asked questions of our participants.

3.2. Participants, treatment, and measurement

Our voluntary study participants were undergraduate business students from a southeastern university. As part of the research experience program, students earn participation credit for taking part in research projects. No best answers were possible and so we provided no external incentives. Our independent variable, presentation format, consists of three presentation formats—text, image, and video. The dependent variables were consumer perceptions of credibility, helpfulness, and persuasiveness of online reviews, and intentions to purchase the product. Prior research and the elaboration likelihood model indicate that the level of participant involvement may have an effect. We countered this through a repeated measure design, so that individual difference effects, if any, including level of involvement with the product, were controlled. We also evaluated participants' intentions to purchase the product at the start of the experiment, and used this prior intention to purchase as a control factor in hypotheses tests.

3.3. Experimental procedures

To conduct a systematic study and develop the soundness of experimental procedures, we conducted our study in three stages. Our pre-pilot study used 20 participants to test the feasibility of the experimental procedures and the appropriateness of online reviews and product types. Based on those results, we altered the length of the online reviews and modified our experimental procedures. We tested the modified procedures with a pilot study after about eight weeks, with 71 participants. Four participants were dropped for failing to follow experimental procedures (e.g., texting during the experiment). Our tests showed high scale reliability of the constructs with Cronbach's alpha being greater than 0.7, and factor loadings greater than 0.7, and exhibiting convergent and discriminant validity as well [5,16,17,33]. Thus, as is generally recommended, we used the pilot study to validate our instruments before collecting data. Tests from the pilot study showed support for our hypotheses on presentation format. We then conducted the main experiment, described below, by recruiting a larger group of participants.

Our experiments were conducted in a specially designed computer laboratory with an independent cubicle for each participant. Because our experiment was conducted online, after receiving general instructions, participants started their work by clicking on the shortcut icon

displayed on the computer screen. After they answered the questionnaire about background demographic information and perceptions of product type, they read a vendor-provided product description. Next they saw the online review, in the randomly generated presentation format, and then answered a questionnaire that gauges their perceptions of the credibility, helpfulness, and persuasiveness of online reviews. They also answered questions about their intentions to purchase the product. This was repeated for the three products. Each participant received reviews using the three presentation formats, one for each product. So, a participant might view one review on the backpack in text format, followed by a review of the camera in image format, followed by a review of the videogame in video format. Fig. 4 shows the procedure and points of measurement. The total experiment lasted approximately 30 min. After completion, participants were asked to fill an open-ended opinion survey. To provide a more visual presentation of our experimental procedures, we have created a YouTube video available at: <http://www.youtube.com/watch?v=udHjcH9sbvk>.

4. Results and Findings

Of the 114 participants, we obtained a usable sample of 110, after dropping four who failed the manipulation check questions. Participants' age averaged 21, ranging from 19 to 37, with a standard deviation of 2.37. Participants included 60.9% men and 39.1% women, reflecting the gender composition of upper-division business students at the college. The average self-reported GPA was 3.16, ranging from 2.0 to 4.0. Most participants (86.4%) shopped online at least once every six months. Most reported reading online reviews when shopping (88.2%). Our random assignment of participants led to the sample sizes in each treatment condition as shown in Table 1. The result of symmetry testing ($p = 0.822$) indicates there is no evidence to say this is asymmetric; that is, this sample distribution is balanced.

4.1. Tests on demographic difference

The number of participants in the six conditions (see Appendix A) ranged from 16 to 22, with a median of 18. We found no significant demographic differences across the six conditions. The p -value for the tests of differences on all 12 demographic variables ranged from 0.254 to 0.874, including gender (0.811), age (0.724), GPA (0.868), average

Table 1
Participants in each condition.

Product	Text	Image	Video	Total
Backpack	34	36	40	110
Camera	36	40	34	110
Videogame	40	34	36	110

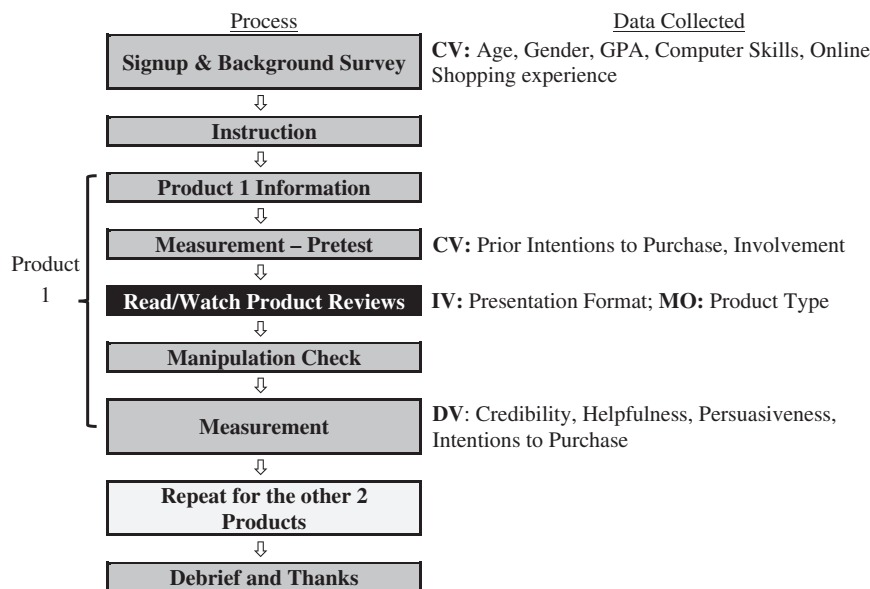
hours spent on computers daily (0.874), average online shopping hours (0.647), and experience with online reviews (0.754). In addition, we found no demographic differences across presentation formats and product types.

4.2. Manipulation check on product type

Before they read product reviews, participants were asked to state how likely they could assess product performance, quality, style and appearance for each of the three products on a Likert-type scale ranging from not at all (1) to very well (7), which we call product type evaluation [35,51]. A score over the median of 4 would indicate that the participant perceived a product as a search product and below 4 would indicate an experience product. We used this scale not as a survey instrument to conduct statistical analysis, but solely as a manipulation check to ensure that the three products were perceived as having differing characteristics as described in the literature. The results shown in Table 2, indicate that the three product types were perceived differently; the videogame was viewed as an experience good, the digital camera a search good, and the backpack falling in between an experience and search good, and our treatment on product type was successful.

4.3. Measurement properties

Table 3 describes the means and standard deviations of the four dependent variables: credibility, helpfulness, persuasiveness, and intentions to purchase, along with their reliability scores (Cronbach's alpha and composite reliability), average variance extracted (AVE), and correlations between the four factors. The measurement quality of the four factors is further assessed. First, both Cronbach's alpha and composite reliability of each factor are much higher than the recommended cutoff value, demonstrating measurement reliability [33]. Second, all factor



DV: Dependent Variables, IV: Independent Variables, CV: Control Variables, MO: Moderator

Fig. 4. Research design.

Table 2
Manipulation check on product type.

Product	Performance	Quality	Style	Appearance	Overall
Digital camera	4.24	4.36	5.15	5.36	4.78
Backpack	4.52	4.55	4.70	4.67	4.61
Video game	3.39	3.58	3.33	3.42	3.43

Note: Performance, quality, style, and appearance denote four items of product type evaluation.

loadings (see Appendix D) are higher than the recommended minimum value of .60, indicating a high convergent validity [16]. Finally, the square root of AVE for each factor (diagonal elements) is higher than the correlations between the factor and other factors (off-diagonal elements), demonstrating a high discriminant validity [5,17]. Additionally, fit indices of the measurement model (confirmatory factor analysis) were acceptable: $\chi^2/df = 4.26$, SRMR = .040, RMSEA = .099, CFI = .94, IFI = .94, TLI = .93, overall, indicating that the study constructs, had high reliability and validity. Because subjects were randomly assigned to one of the six conditions (see Table 1), the condition effect was tested. Our tests did not indicate a significant condition effect: credibility (0.089), helpfulness (0.680), persuasiveness (0.088), and intentions to purchase (0.880). Hence, we proceeded to test the hypotheses.

4.4. Tests of hypotheses

We test the first two hypotheses on consumer perceptions of online reviews using multivariate analysis of covariance (MANCOVA), and then test the third hypothesis on intentions to purchase, using structural equation modeling (SEM) techniques. It was not appropriate to use SEM to test the first two hypotheses because we were interested in testing the significance of the moderation effect as well as exploring more details about the moderation effect [55]. Additionally, both product type and review presentation format are categorical variables, and therefore it is more appropriate to use MANCOVA instead of SEM [6]. The results of hypotheses tests are summarized in Table 4.

4.4.1. Impact on consumer perceptions of online reviews

As shown in Table 3, the three dependent variables evaluating perceptions of the product review for credibility, helpfulness, and persuasiveness were correlated, and the independent variables, product type and review presentation format, are nominal variables. We thus conducted a MANCOVA to test our first hypothesis. Levene's tests for homogeneity of variances were significant on helpfulness ($p = 0.021$) and persuasiveness ($p = 0.011$), but because we had a nearly equal group size, the Pillai's test for MANCOVA will not be affected [63]. The results are reported in Table 5. The effects of presentation review format on the combination of dependent variables are significant ($p < 0.001$). Also, an interaction effect is identified between presentation format and product type ($p = 0.016$).

Table 3
Descriptive statistics, correlation coefficients, reliability, and validity.

Factor	Mean (SD)	CA	CR	AVE	Correlation matrix			
					F1	F2	F3	F4
F1: Credibility	4.83 (1.14)	.903	.929	.726	.852			
F2: Helpfulness	4.82 (1.34)	.893	.933	.823	.763	.907		
F3: Persuasiveness	4.56 (1.29)	.906	.934	.780	.818	.802	.883	
F4: Intentions to purchase	3.53 (1.73)	.963	.973	.900	.457	.462	.579	.949

Note: SD denotes standard deviation; CA denotes Cronbach's alpha; CR denotes composite reliability; AVE denotes average variance extracted; Diagonal elements on correlation matrix display the square root of AVE. Intentions to purchase were measured before and after participants received the online reviews. The reliability and validity were high at both measurement points. To conserve space, we report the scores for the second measurement point.

Table 4
Summary of findings.

	Hypotheses	Findings
H1a	Video-based online reviews are perceived to be more credible, compared to text-based online reviews.	Strongly supported
H1b	Video-based online reviews are perceived to be more helpful, compared to text-based online reviews.	Strongly supported
H1c	Video-based online reviews are perceived to be more persuasive, compared to text-based online reviews.	Strongly supported
H2a	Video-based reviews generate larger positive impact on consumer perceptions in terms of credibility, for experience goods compared to search goods.	Mixed support
H2b	Video-based reviews generate larger positive impact on consumer perceptions in terms of helpfulness, for experience goods compared to search goods.	Mixed support
H2c	Video-based reviews generate larger positive impact on consumer perceptions in terms of persuasiveness, for experience goods compared to search goods.	Mixed support
H3	More positive perceptions of online reviews will lead to greater intentions to purchase the product.	Strongly supported

Follow-up univariate ANOVAs (see Table 6) indicate that the effects of review presentation format are significant on credibility ($p < 0.001$), helpfulness ($p < 0.001$), and persuasiveness ($p < 0.001$) when examined separately. In particular, video format significantly discriminates from text and image formats, but the last two are not distinguished from each other. The moderation effect of product type is strongly significant for helpfulness ($p = 0.020$), and persuasiveness ($p = 0.001$), and weakly significant for credibility ($p = 0.081$). Also, product type has no direct effect on the three dependent variables, which is as expected.

In Fig. 5, we pictorially present the means of product type and presentation format. There are three dependent variables in this study, each of which includes a 3×3 interaction figure (presentation format * product type). It will be messy to show all these effects in one figure. Hence, keeping in line with prior published papers [32,61,105], we decided to present the interaction effects in three separate figures (Fig. 5a, b, c). It is seen that video format as compared with text format improves perceptions for all products, with the ratio of improvement ranging from 15% to almost 50%. The videogame has larger improvement from text to video format, compared to the camera, which is consistent with our hypotheses. However, to our surprise, the backpack shows the largest improvement in consumer perceptions of online reviews, and we discuss the explanation later.

4.4.2. Impact on intentions to purchase

To test hypothesis 3, we developed and tested a structural equation model. The three factors (credibility, helpfulness and persuasiveness) are highly correlated but distinct from each other. We therefore built a first-order factor in which the three first-order factors are freely correlated with each other, followed by a second-order factor model in which the three first factors are treated as reflective indicators of the second-order factor of perception of online reviews. Following recommendations, we used two criteria to compare the two models [101, 107,110]. First, we found very similar fit indices of the two models. Therefore, the second-order factor model is preferred over the first-order factor model because it explains more parsimoniously the covariance among the first-order factors [107]. Additionally, the target coefficient is the ratio of the chi-square of the first-order model to the chi-square of the more restrictive model and is used to compare the

Table 5
Results of Pillai's multivariate tests of significance.

Effect	Value	F	df1	df2	Sig.
Product type	.037	1.983	6	636	.066
Presentation format	.151	8.670	6	636	.000
Product type $\times$ presentation format	.076	2.078	12	957	.016

Table 6
Results for follow-up univariate tests.

	Dependent variable	F	df1*	Sig.
Product type	credibility	.050	2	.951
	helpfulness	.230	2	.795
	persuasiveness	2.294	2	.103
Presentation format	credibility	15.674	2	.000
	helpfulness	18.474	2	.000
	persuasiveness	26.205	2	.000
Product type × presentation format	credibility	2.099	4	.081
	helpfulness	2.965	4	.020
	persuasiveness	4.711	4	.001

* Degree of freedom for errors equal to 319.

two models [75,103]. When the target coefficient is close to its upper bound of 1.0, the second-order factor model is preferred over the first-order factor model. The target coefficient value is .98, which is very close to 1. Therefore, second-order factor model is recommended.

Because we detected the moderation effect of product type, we conducted a multi-group structural model, in which each product was considered as one group. Fit indices of the multi-group structural model ($\chi^2(300) = 710.93$) were as follows: $\chi^2/df = 2.37$, SRMR = .062, RMSEA = .065, CFI = .92, IFI = .91, TLI = .89, all being close to the recommended level. The results of the structural model testing, including standardized regression coefficient (between consumer's perception of online reviews and purchase intentions) and R Square, are described in Fig. 6. All three regression coefficients were significant at the 0.001 level, indicating that H3 was supported by all three products. R square of intentions to purchase the product is higher than 30% for each product, demonstrating that our model has a high explanation power.

5. Discussion

Online reviews using video presentation format is being introduced by vendors, and we examined its relative influence on consumer perceptions vis-à-vis popular text formats. We found that video format when compared to text format has a significant positive influence on consumer perceptions and their intentions to purchase, but this effect also depends on product type, indicating a fit between the target task

and presentation format. This highlights the necessity for more research focus into understanding influences of presentation formats and other IT-related affordances of online reviews, and practically speaking, underscores the value of managing presentation formats.

5.1. Contributions to research, theory and practice

Research on online reviews is advancing from the initial stages where questions on “what” features influence consumer perceptions were addressed (e.g. [82]) to answer questions on “how” can consumers perceptions be influenced (e.g. [13,14]). Our research extends this trajectory by indicating that for certain products, providing incentives for posting online reviews in video formats will be beneficial to the vendor. While prior research shows that argument quality, the persuasive content of online reviews, could affect perceptions of credibility of a review, our research indicates that another route could be via the IT affordance of video presentation format [13]. Our research adds to the importance of the IT components such as video presentation formats, not only in product descriptions, but also on descriptions and opinions posted by buyers [55,82]. Our findings also suggest that presentation formats can serve as an important stimulus in influencing consumer product perceptions [14].

A cumulative research tradition in IS based on cognitive fit has established that IT enabled affordances allowing the use of differing presentation formats could influence user perceptions and decision outcomes [112]. While most of these studies are conducted in decision aiding displays and learning systems, which are generally engineered by IT professionals, we identify effects in user generated content, thus extending this cumulative tradition to demonstrate the robustness of cognitive fit theory [111]. Elaboration likelihood model also has a cumulative tradition in IS in understanding e-commerce related phenomenon [13,62,87,106]. Hence, our expected predictions on the superiority of video based formats add to the use of these theories and show it could be applied to further research on e-commerce.

On the backpack, our results were not as expected but can be explained by the fact that backpack does not clearly belong to a specific product type because it is classified, as being in-between an experience and search good. In one study, a little more than 50% of respondents classified a backpack as a search good, or in other words almost half

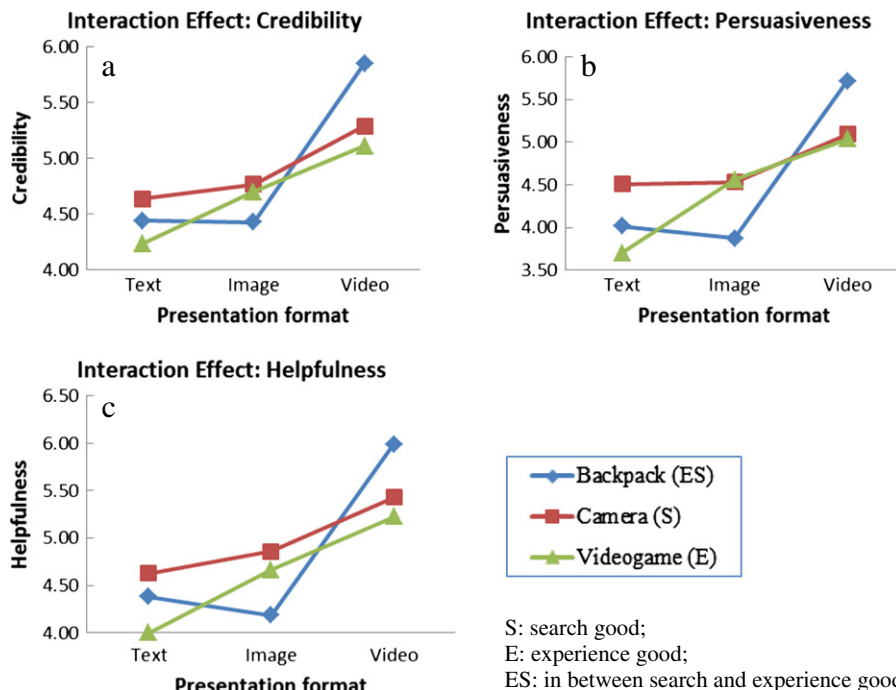


Fig. 5. Interaction effect of presentation format and product type.

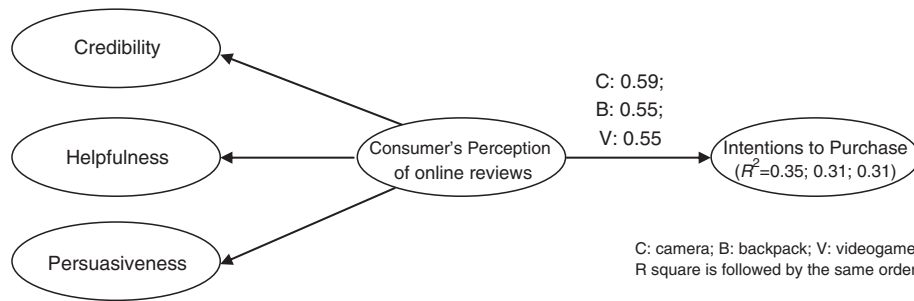


Fig. 6. Results of the multi-group structural equation model.

the people surveyed felt it was an experience good [35]. Our findings indicating that backpack showed a very pronounced effect for video presentation format suggests it is more of an experience good. Product features may be considered either digital or non-digital, with experience goods having more non-digital attributes such as shape and textures [72]. Viewing the backpack from this perspective, the product's texture, color, and spatial attributes may give it stronger experience characteristics, so that the effect of video presentation format on backpack was more pronounced than that of text format. Digital cameras are standardized products, with generally known shapes, sizes, and textures, and are, therefore, search goods. If we treat backpack as an experience good, given that almost half of survey respondents in earlier surveys classified it as such, then the result fully supports our hypothesis that video formats are more effective than text formats for experience goods than for search products, highlighting a fit between presentation format and product type. Interestingly, the unexpected results on the backpack, is similar to a few other emerging findings that actually support research suggesting that IT is changing definitions of search and experience products [51,59,114].

From a practice perspective, we add to prior IS findings that vendors must carefully consider presentation formats [43,56]. We used images to replicate practice and found no effects, perhaps because images in online reviews add no additional information over and above descriptions provided by the vendor. But video-based presentation formats increased consumer perceptions of the review when compared with text-based reviews, with ratios of increase ranging from 15% in the perceptions of credibility and helpfulness of the camera review, to almost 50% in the perception of persuasiveness of the backpack online review. Vendors could perhaps offer incentives encouraging consumers to post video reviews to counter the overload of multiple reviews, to grab consumer attention, and to persuade them to purchase the products. Vendors must recognize that this strategy may provide unique leverage for certain product types.

5.2. Limitations

As with any empirical study, ours has several limitations. We use student participants who are comfortable with online shopping, purchase online, but are future consumers of the products studied, and hence they offered a representative sample. ELM would suggest that we evaluate consumer involvement with the product, but we chose to control with a repeated measures study design, and by using pre-intention measures as a control [89]. We did not parse out the effect of whether the superiority of video reviews was only through peripheral route, but our study goal was not to identify central vs peripheral route effects, rather it was to use ELM and media richness framework to suggest that video reviews, based on prior studies, is likely to have additional peripheral effects. We were compelled to use neutral reviews because negative reviews and language extremity effects may influence

consumer perceptions but would be difficult to predict, isolate, and would lead to confounds [116].

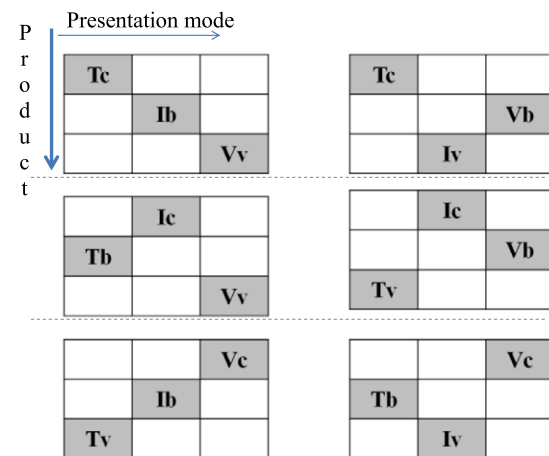
5.3. Future research and concluding remarks

Our research on online reviews could be enhanced and extended in many ways, particularly in studying the influence of IT aspects, such as advanced visual formats such as 3-D and virtual experiences [64,100]. Marketing researchers argue that the visualization of information is critical in an e-commerce environment and online reviews would be a good area for IS researchers to better define and study the role of the IT artifact [9,74,79,86]. Hence, from a theoretical perspective, it will be useful to design studies that can tease out the peripheral and central route effects created by video reviews vis-à-vis text formats. While discussions of ELM tend to treat effects by the peripheral and central route to be independent, a similar model, the heuristic-systematic model which also describes how information processing is conducted by people, *explicitly* recognizes the co-existence of both systematic (similar to central route) and heuristic (similar to peripheral route) processing. This model is now starting to emerge as a framework to study online reviews, and could help develop more nuanced models that identify factors (such as source credibility) affecting the processing of information through the central route [120]. Overall, the use of these emerging models could improve our understanding of effects of online reviews in a more granular fashion, and also add to our knowledge on human information processing.

Research could examine effects of presentation formats using other classifications of products, such as hit or niche, or use analytical methods for classification on a larger range of products, or use characteristics such as digital attributes [23]. Research might focus on effects of presentation formats on user perceptions of review credibility and the influence of credibility on customer loyalty and other consumer responses [38]. Our findings reiterate that IT can play a crucial role in e-commerce and that IS researchers may find extensive research potential for investigating and designing better human-computer interaction functionalities [7].

Our experimental controls could be relaxed and the effects of other attributes such as language extremity shown in video vs. text format could be compared [62,73]. Online reviews could be viewed as a type of social interaction between consumers [37]. If online reviews are posted on social media, what effects occur vis-à-vis posting on a vendor's website? If online reviews are an exchange of information between consumers, theories such as media synchronicity and social perspectives to information sharing could be applied to test the effects of electronic WOM [26,80]. This is a first study on effects of video reviews that we hope will encourage more research that can identify, at a finer grained level, factors that affect consumer opinions through presentation formats of reviews. Online review is a very important topic in IS research as evidenced by recent studies [1,14,52,120]. Our study contributes to this growing literature by highlighting the role of the presentation format.

Appendix A. Counterbalancing products and presentation formats



T: Text-based Review; I: Image-based Review; V: Video-based Review; c: camera; b: backpack; v: video game

Appendix B. Sources of measures

Variables	Role	Definition	Items	Source
Credibility	DV	The extent a recipient of a message believes that it is true, objective, trustworthy and reliable.	5	Hilligoss and Rieh [41]
Helpfulness	DV	The extent to which a peer-generated product evaluation facilitates the consumer's purchase decisions; sometimes it is referred as diagnosticity.	3	Jiang and Benbasat [54], Mudambi and Schuff [82]
Persuasiveness	DV	The extent a review is perceived as convincing and helpful	4	Zhang et al. [119]
Intentions to purchase	DV	The extent a consumer is willing to purchase the product in the near future (before/after exposed to online reviews).	4	Jiang and Benbasat [55]
Involvement	CV	The extent of time, thought, energy and other resources consumers devote to the purchase process.	5	Hess et al. [40]

DV: dependent variable; CV: control variable.

Appendix C. Product selection and illustration

Product	Description	Type	Source
Digital camera	The second generation of Flip Ultra video camera	Search	Mudambi and Schuff [82], Nelson [83]
Backpack	30 liter crossover Thule backpack	In between	Girard and Dion [35]
Video game	A virtual pet game for PlayStation 3, developed by Sony Computer Entertainment	Experience	Mudambi and Schuff [82]

Appendix D. Measurement items

Variables	Measures
Credibility	How do you rate the truthfulness of this product review? To what extent do you believe this product review? To what extent do you think this product review is trustworthy? To what extent do you think this product review is objective? To what extent do you think this product review is reliable?
Helpfulness	The product review is very helpful in judging the quality of the product. The product review helps me on the overall evaluation of the product? The product review helps me familiarize myself with the product?
Persuasiveness	What do you think about the persuasiveness of this review? What do you think about the helpfulness of this review? What do you think about the importance of this review? What do you think about the convincingness of this review?
Intentions to purchase (Before and After)	Based on this product description, I would recommend my friend to buy this product. Based on this product description, I will purchase this product the next time I need a product like this. Based on this product description, it is likely that I will buy this product. Based on this product description, I will definitely try this product.
Involvement	While going through the product review I was able to block out most other distractions. While going through the product review, I was absorbed in what I was doing. While going through the product review, I was immersed in the task I was performing. When going through the product review, I get distracted by other attentions very easily. While going through the product review, my attention did not get diverted very easily.

Appendix E. Descriptive statistics of items and factor loading

Factor	Item Abbreviation ^a	Mean (SD)	Factor Loading
Credibility	Credibility1	5.06 (1.29)	0.881
	Credibility2	5.03 (1.31)	0.913
	Credibility3	4.81 (1.36)	0.897
	Credibility4	4.53 (1.38)	0.686
	Credibility5	4.74 (1.42)	0.861
Helpfulness	Helpfulness1	4.76 (1.56)	0.920
	Helpfulness2	4.88 (1.44)	0.884
	Helpfulness3	4.83 (1.44)	0.918
Persuasiveness	Persuasiveness1	4.41 (1.44)	0.875
	Persuasiveness2	4.91 (1.50)	0.877
	Persuasiveness3	4.53 (1.43)	0.874
	Persuasiveness4	4.40 (1.48)	0.906
Intentions to purchase	Intentions1	3.70 (1.84)	0.944
	Intentions2	3.66 (1.86)	0.949
	Intentions3	3.34 (1.75)	0.958
	Intentions4	3.43 (1.86)	0.943

^a Item Abbreviation is matched with the item statement in Appendix D at the same order.

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